AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. Contract ID Code	Page	Of
Cost-Plus-Fixed-Fee	1	7

2. Amendment/Modification No.	3. Effective Date	4. Requisition/Purchase Req No.	5. Project No. (If applicable)
P00008	2003DEC31	SEE SCHEDULE	

6. Issued By Code W56HZV

TACOM WARREN BLDG 231
AMSTA-AQ-ABGD
JOHN STEVES (586)574-7272
WARREN, MICHIGAN 48397-5000
HTTP://CONTRACTING.TACOM.ARMY.MIL
EMAIL: STEVESJ@TACOM.ARMY.MIL

7. Administered By (If other than Item 6) Code S0507A

DCMA SAN FRANCISCO
P.O. BOX 232
700 EAST ROTH ROAD, BLDG 330
FRENCH CAMP CA 95231-0232

SCD C **PAS** NONE **ADP PT** HQ0339

8. Name And Address Of Contractor (No., Street, City, County, State and Zip Code)

UNITED DEFENSE, L.P.
GROUND SYSTEMS
1205 COLEMAN AVENUE
PO BOX 58123
SANTA CLARA, CA. 95052-4368

TYPE BUSINESS: Large Business Performing in U.S.

Code 80212 **Facility Code**

☐ **9A. Amendment Of Solicitation No.**

9B. Dated (See Item 11)

☒ **10A. Modification Of Contract/Order No.**

DAAE07-00-C-L054

10B. Dated (See Item 13)
2000SEP29

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ **The above numbered solicitation is amended as set forth in item 14. The hour and date specified for receipt of Offers**
☐ **is extended,** ☐ **is not extended.**

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods: (a) By completing items 8 and 15, and returning _____ copies of the amendments: (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. Accounting And Appropriation Data (If required)
NO CHANGE TO OBLIGATION DATA

13. THIS ITEM ONLY APPLIES TO MODIFICATIONS OF CONTRACTS/ORDERS

KIND MOD CODE: G

It Modifies The Contract/Order No. As Described In Item 14.

☐ **A. This Change Order is Issued Pursuant To: The Changes Set Forth In Item 14 Are Made In The Contract/Order No. In Item 10A.**

☐ **B. The Above Numbered Contract/Order Is Modified To Reflect The Administrative Changes (such as changes in paying office, appropriation data, etc.) Set Forth In Item 14, Pursuant To The Authority of FAR 43.103(b).**

☒ **C. This Supplemental Agreement Is Entered Into Pursuant To Authority Of:** Agrreement of the Parties

☐ **D. Other (Specify type of modification and authority)**

E. IMPORTANT: Contractor ☒ **is not,** ☐ **is required to sign this document and return _____ copies to the Issuing Office.**

14. Description Of Amendment/Modification (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

SEE SECOND PAGE FOR DESCRIPTION

Except as provided herein, all terms and conditions of the document referenced in item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. Name And Title Of Signer (Type or print)		16A. Name And Title Of Contracting Officer (Type or print)	
		JOHN M. HOPFNER HOPFNERJ@TACOM.ARMY.MIL (586)574-7070	
15B. Contractor/Offeror	**15C. Date Signed**	**16B. United States Of America**	**16C. Date Signed**
_____ **(Signature of person authorized to sign)**		**By** /SIGNED/ **(Signature of Contracting Officer)**	2004JAN23

SECTION A - SUPPLEMENTAL INFORMATION

PROGRAM: Composite Armored Vehicle-Advanced Technology Demonstrator (CAV-ATD) Applications to Integrated, Hybrid Structures

PURPOSE OF MODIFICATION: Extend Period of Performance

PRIOR CONTRACT AMOUNT: $9,426,934.00

CONTRACT AMOUNT REVISED THIS ACTION: $ -0-

TOTAL CONTRACT AMOUNT: $9,426,934.00

PRIOR OBLIGATED AMOUNT: $9,426,934.00

AMOUNT OBLIGATED THIS ACTION: $ -0-

TOTAL OBLIGATED AMOUNT: $9,426,934.00

The purpose of this modification is to extend the hardware (F.2.1 & F.2.2) and final report (C.2.4.3/F.3.1) delivery dates of the contract from December 31, 2003 to February 29, 2004.

This is a bilateral modification.

The contract is modified as follows:

1. Section C is revised to reflect the extension of the submission date for the Scientific and Technical Report (TR#2, C.2.4.3) from December 31,2003 to February 29, 2004.

1. Section F is revised to reflect the extension of the deliverables in F.2.1 and F.2.2 and the period of performance stated in F.3.1 to February 29, 2004.

2. As a result of this Modification P00008 the total contract and obligated amounts remains unchanged at $9,426,934.00. The funding breakout for this action is summarized below:

CLIN 0001	PREVIOUS CONTRACT AMOUNT	AMOUNT THIS ACTION	TOTAL AMOUNT
Estimated Cost:	$8,812,674.00	$ -0-	$8,812,674.00
Fixed Fee:	$ 614,260.00	$ -0-	$ 614,260.00
Total Estimated Cost:	$9,426,934.00	$ -0-	$9,426,934.00

Previous Total Obligated Amount: $9,426,934.00
Amount Obligated This Action: $ -0-
New Total Obligated Amount: $9,426,934.00

3. Except as specifically provided for in this Modification P00008, all other terms and conditions of Contract DAAE07-00-C-L054 as previously modified remain unchanged and in full force and effect.

*** END OF NARRATIVE A 001 ***

SECTION C - DESCRIPTION/SPECIFICATIONS/WORK STATEMENT
SECTION C
Scope of Work

Study of Composite Armored Vehicle Advanced Technology Demonstrator
(CAV ATD)-Applications to Integrated, Hybrid Structures

C.1. The contractor shall conduct concept design studies with the objective of extending composite structural armor technology developed under the Composite Armored Vehicle (CAV) program (DAAE07-94-C-R011) to an emerging combat vehicle system. The design studies shall integrate current state-of-the-art advancements in high performance metallics with composite structural armor technology to evaluate the synergistic benefits in non-traditional hybrid structural approaches such as stiffened skin, sandwich, and space-frame designs.

C.1.1. Concept Development. The contractor shall develop a design concept (C.1.1.1-6) for a minimum of two (2) different vehicle platforms. Conformance with C130 RO/RO, squad egress/ingress, adaptability of add-on armor, and mission profile shall be considered major requirements during the development of the integrated hybrid structures.

C.1.1.1. Requirements. The contractor shall identify performance, design, development, and test requirements (e.g., envelope, weight, mobility, modularity, etc.) that drive the structure/armor concepts per C.1.1 in a Design Parameter Document (DPD). The DPD, which provides complete definition of the design criteria, shall be included in the Final Technical Report.

C.1.1.2. Vehicular Platform Configurations. The contractor shall develop a vehicular platform configuration for each of the selected concepts based on a contractor-selected base chassis of the appropriate role and weight class from the existing worldwide combat vehicle fleet. Each vehicular platform configuration shall include computer-generated models illustrating space claims and interfaces of major subsystems. The optimum vehicular platform configuration shall be documented in the Final Technical Report. Mature system level computer-generated models of the optimum platform configuration shall be prepared to support the development of one(1) technical data packages (C.1.1.6.1) which define the full-scale demonstration hardware (C.1.3.1.1).

C.1.1.3. Technology Maturity Assessment. The contractor shall assess the maturity of candidate high performance metallic and composite structural armor technologies based on the Technology Readiness Levels (TRL) definitions (Attachment 1) from the Best Practices report (GAO/NSIAD-99-162) issued by the United States General Accounting Office. Target TRL values for candidate technologies must range from 3.5 to 6.0. The contractor shall demonstrate the maturity of candidate technologies to validate TRL values through performance demonstrations, as required, in C.1.3. TRL assessments shall be included in the Final Technical Report.

C.1.1.4. Hybrid Structure/Armor Design Concepts. The contractor shall develop two (2) hybrid structure/armor design concepts for each platform resulting in a total of four (4) concepts, with a minimum base level armor protection of 7.62 mm AP. These hybrid structure/armor design concepts shall be designed to accommodate the loads and mounting provisions for "add-on" survivability kits, which are considered non-developmental items (NDI). All four (4) design concepts shall be described in the Final Technical Report.

C.1.1.5. Design Concept Down-select. The contractor shall prepare a trade study matrix for contractor down-selection of structure/armor design concepts provided in C.1.1.4 using weighting factors from the CAV program-Government Priorities and Technical Performance Measures (TPMs)(Attachment 2). The optimum structure/armor design concept shall be determined by comparing ballistic performance, structural performance, and subsystem requirements compliance using the trade study matrix. The completed trade study shall be included in the Final Technical Report.

C.1.1.6. Concept Development and Detailed Design. The contractor shall further develop the design details for the contractor down-selected structure/armor design concepts from C.1.1.5. For each optimum structure/armor design concept, the contractor shall identify all structural elements through computer-generated models or sketches/drawings and the corresponding technologies from C.1.1.3 required to manufacture them. Detailed design concepts for the selected platforms shall be incorporated into the Final Technical Report.

C.1.1.6.1 Technical Data Packages (TDP's). Based on the recommendation for the future full-scale manufacturing trials and demonstrations from C.1.3.1, the contractor shall select, and the Government approve, one (1) of the detailed design concepts from C.1.1.6 and after Government approval the contractor shall prepare a supporting technical data package for each concept. These TDPs shall include computer-generated models and drawings that define the full-scale demonstration hardware (C.1.3.1.1).

C.1.2. Analysis. The contractor shall evaluate, quantitatively, the costs and the benefits associated with each of the design concepts developed per C.1.1. The existing combat vehicle whose base chassis was selected in C.1.1.2 will serve as the baseline for these assessments.

C.1.2.1. Cost Modeling. The contractor shall develop production cost estimates using parametric cost estimation techniques for each hybrid structure/armor design concept considered in C.1.1.4. Production cost estimates shall be made for three (3) different production runs of 1000, 3000, and 5000 combat vehicles over a six (6) year procurement cycle, respectively. Production cost estimates for the optimum structure/armor design concept identified in C.1.1.5 and the baseline shall be included in the Final Technical Report.

C.1.2.2. Weight Assessment. the contractor shall estimate the structure and armor weight of each of the four (4) hybrid structure/armor design concepts per C.1.1.4 and compare each to the weight of the baseline. Weight study information shall be summarized in the Final

Technical Report.

C.1.2.3. Dynamic Analysis. The contractor shall develop critical loads for each selected variant using Dynamic Analysis and Design Systems (DADS) techniques. These loads shall be used to assess and trade-off the various structure/armor design concepts, developed in C.1.1.4, as well as provide input for static analysis and structural testing. Critical loads shall be documented in the Final Technical Report.

C.1.2.4. Global Structural Analysis. The contractor shall take static equivalent loads from DADS (C.1.2.3) and apply them to the chassis FEA model to study the global structural response of each of the structure/armor design concepts developed in C.1.1.4. The global analysis results will be used to identify critical regions for detailed FEA and structural test. A summary of the global analysis results shall be incorporated into the Final Technical Report.

C.1.2.5. Detailed Structural Analysis. The contractor shall identify critical regions, interfaces and joints for the optimum structure/armor design concepts from C.1.1.5. Detailed FEA models of a critical region for each design concept shall be constructed and analyzed. These detailed FEA models shall be used to assess various design concepts, as well as provide predictions of structural response to support structural testing in C.1.3.2. A summary of the detailed analysis results will be incorporated into the Final Technical Report.

C.1.3. Performance Demonstrations. The contractor shall fabricate and test critical regions of selected structure/armor design concepts developed in C.1.1.4 to demonstrate producibility and validate the performance of the candidate technologies selected in C.1.1.3. The approach to performance demonstrations is an iterative process of fabricate and test to progressively validate technologies and design concepts from sub-scale to full-scale.

C.1.3.1. Manufacturing Trials. The contractor shall fabricate ten (10) representative panels or sections using the candidate technologies selected in C.1.1.3. To assess performance of critical regions of the structure/armor design concepts developed in C.1.1.4, two (2) of the panels/sections shall be used for structural testing per C.1.3.2 and the remaining eight (8) shall be used for ballistic testing per C.1.3.3-4. An assessment of manufacturing issues associated with the full-scale manufacturing shall be included in the Final Technical Report.

C.1.3.1.1 Full Scale Demonstration. The contractor shall conduct a full-scale manufacturing trial of the design concept TDP from C.1.1.6.1 in order to fabricate hardware suitable for subsequent integration into a combat vehicle system for field evaluations. Documentation and assessment of the manufacturing process and hardware shall be included in the Final Technical Report.

C.1.3.2. Structural Testing. The contractor shall statically test up to four (4) and fatique test at least one (1) representative panels or sections to validate the structural response of the structure/armor design concepts developed in C.1.1.3. Structural test results shall be included in the Final Technical Report.

C.1.3.3. Base Level Ballistic Testing. The contractor shall ballistically test seven (7) representative panels or sections to validate minimum heavy machine gun AP base level armor protection developed in C.1.1.4. Ballistic testing shall be conducted at the contractor's facility and targets shall be a minimum size of 2 feet by 2 feet. Full report of all ballistic test results shall be included in the Final Technical Report.

C.1.3.4 "DELETED"

C.1.4. Environmental Assessment. The contractor shall conduct assessments, analyses and trade studies to ensure consideration of environment, safety, and health issues. Results shall be documented in the Final Technical Report. The objective in all cases is to eliminate any potential pollutants, hazardous material usage, and safety and health issues, and to minimize pollutants and health or safety risks in any instance where complete elimination is not possible. The studies shall identify, evaluate, and make recommendations to eliminate where possible, or otherwise to control and mitigate foreseen environmental, safety, and health risks associated with producing and using the contractor's advanced design structures. The contractor shall consider both direct and indirect environmental consequences associated with the production, testing, operation and disposal of advanced structures, in accordance with the Code of Federal Regulations Title 40, Protection of the Environment, Parts 1500 through 1508. The contractor's work will emphasize pollution prevention rather than "end of pipe" treatment, in accordance with Executive Order 12856. This work will consider manufacturing requirements to ensure that manufacturing methods will abide by Federal, state, and local environmental regulations. The contractor's work in this area shall include compliance with requirements for elimination of Ozone-Depleting Substances (ODS) during manufacturing and operation of advanced structures. The contractor shall design with non hazardous materials to the maximum extent practicable, while ensuring that the materials selected for use will support the intended functioning of the product. Any materials used, and all coatings used to enhance the performance of the final product (a) shall be non-hazardous wherever possible, and (b) shall present no cumulative or future environmental hazards caused either by material degradation over time or by demilitarization or disposal at the end of the vehicle's service life. The contractor is encouraged to make use of recycled materials to the maximum extent possible, provided that such use does not impair the performance and safety of the final product. A summary of the contractor's assessments, analyses and studies regarding environmental, safety and health issues, shall be included in the Final Technical Report.

C.1.5. Data Reports

C.1.5.1 Progress, Status and Management Reports. The contractor shall submit a Progress, Status and Management Reports in accordance with Contract Data Requirements List DI-MGMT-80227. The report shall detail technical progress to date, report technical issues, summarize contract costs and significant developments during the reporting period. The reports shall be submitted to the Government electronically, in a format readable by the Microsoft Office 97 product suite.

C.1.5.2. Scientific and Technical Report. The contractor shall submit a Final Technical Report at the conclusion of work on the 15th month, in accordance with Data Item Description DI-=MISC-80711. The report shall be submitted to the Government electronically, in a format readable by the Microsoft Office 97 product suite.

C.1.5.3 The Final Technical Report shall include the following:

SOW Ref.	Final Technical Report Data
C.1.1.1	Design Parameter Document (DPD) establishing requirements
C.1.1.2	Computer generated models of the vehicular system configurations developed for selected platforms
C.1.1.3	Technology maturity assessment results
C.1.1.4	Two structure/armor design concepts for each selected platform
C.1.1.5	Trade study results identifying an optimum for each selected platform design concept
C.1.1.6	Detailed design concepts of the optimum structure/armor design concepts for each selected platform
C.1.2.1	Production cost estimates for the specified quantity ranges
C.1.2.2	Weight assessment reports for each platform
C.1.2.3	Summary of critical loads for each variant
C.1.2.4	Summary of global analysis results
C.1.2.5	Assessment of critical regions, interfaces and joints and a summary of the detailed analysis results
C.1.3.1	Assessment of manufacturing issues and recommendations for future full-scale demonstrations
C.1.3.2	Structural test results summary
C.1.3.3	Base level ballistic test results summary
C.1.3.4	"Deleted"
C.1.4	Environmental assessment summary

C.2. The contractor shall conduct a minimum of three (3) sets of vehicle structure trade studies to establish the relative applicability and/or relative merits of prior structures, armor, materials and processing developments when applied to the newly emerging combat systems platform requirements. The three structure types to be considered are monocoque, space frame, and hybrid. Prior developments shall include results from the following programs: a) CAV-Integrated Hybrid Structures (IHS), b) Composite Armored Vehicle Advanced Technology Demonstrator (CAV ATD), c) USMC Advanced Armored Amphibious Vehicle (AAAV), d) Crusader and e) the Reconnaissance, Surveillance and Targeting Vehicle (RST-V).

C.2.1. Concept Development. The PCO may later provide or identify by reference documents that define capabilities and/or platform constraints.

C.2.1.1. Vehicle Platform Configurations. The contractor shall select a minimum of three (3) vehicle platform configurations (e.g., ICV, NLOS, Support, etc.) covering a range such as that described in the Future Combat Systems Unit of Action Systems Book AMSAA Version 1.2 dated June 6, 2002.

C.2.1.2. Structural Design Concepts. For each platform configuration selected in C.2.1.1., the contractor shall define and evaluate alternative structure, structural-armor, applique armor and non-traditional, advanced survivability approaches integrated into a vehicular survivability suite. Integration issues, including attachments, shall be included in the evaluation.

C.2.1.3. Design Concept Down-Select. The contractor shall estimate the relative applicability and/or merits of the alternatives, in

rank order, based on selected platform requirements and summarize these in a trade study matrix. Weighting factors shall be provided by the COTR for the purposes of this study. Technology Readiness Level (TRL) shall be included in the rank order assessment. The goal of TRL 9 by FY08 shall be the standard. From this trade study matrix, the contractor shall recommend and the COTR shall approve a design concept to proceed to detailed design. The final trade study matrix shall be provided in Technical Report (TR#1).

C.2.1.4. Concept Development and Detailed Design. The contractor shall develop the design details for the down-selected design concept from C.2.1.3. necessary for the manufacture of full scale structures. The detail designs shall be in CAD format and incorporated into TR#1.

C.2.2. Analysis. The contractor shall evaluate the costs and benefits associated with each of the design concepts developed per C.2.1.2.

C.2.2.1. Cost Modeling. The contractor shall develop production cost estimates using parametric cost estimation techniques for each design concept developed in C.2.1.2. The COTR will provide production quantity estimates.

C.2.2.2. Weight Assessment. The contractor shall estimate the structure and armor weight of each of the concepts developed in C.2.1.2.

C.2.3. Data Reports

C.2.3.1. Progress, Status and Management Reports. The contractor shall submit a Progress, Status, and Management Reports in accordance with Contract Data Requirements List DI-MGMT-80227. The report shall detail technical progress to date, report technical issues, summarize contract costs and significant developments during the reporting period. The reports shall be submitted to the Government electronically, in a format readable by the Microsoft Office 97 product suite.

C.2.3.2. Scientific and Technical Report. The contractor shall submit a Technical Report (TR#1) by December 20, 2002 documenting the trade study matrix results and the down-selected detailed design.

C.2.4. The contractor shall select and the COTR approve the selection of a structure and armor design concept developed in C.2.1.4. to demonstrate the producibility and validate end item performance.

C.2.4.1. Full-Scale Ballistic Test Section. The contractor shall fabricate one (1) full-scale quarter section based on the detailed design in C.2.1.4. The quarter section structure is defined as the front of the vehicle to behind the crew area. It shall provide full base level armor protection and include mounting provisions for add-on survivability kits. The quarter section shall be shipped to Aberdeen Proving Ground, Maryland for integration of their add-on survivability kits and subsequent ballistic evaluation. The assessment and documentation of the quarter section manufacturing process shall be included in TR#2.

C.2.4.2. Full-Scale Structural Test Section. The contractor shall fabricate one (1) full-scale quarter section based on the detailed design in C.2.1.4. The quarter section structure is defined as the front of the vehicle to behind the crew area. It shall provide base level armor protection defined in C.2.1.4 and include mounting provisions for add-on survivability kits. The quarter section shall be shipped to TACOM Warren, Michigan for structural evaluation. The assessment and documentation of the quarter section manufacturing process will be included in TR#2.

C.2.4.3. Scientific and Technical Report. The contractor shall submit a Technical Report (TR#2) by February 29, 2004 documenting the quarter section manufacturing process.

*** END OF NARRATIVE C 001 ***

SECTION F - DELIVERIES OR PERFORMANCE

DELIVERIES/PERFORMANCE

F.1 DELIVERY POINT (TACOM)

All deliveries shall be made electronically in accordance with the Contract Data Requirements List.

F.2 Hardware and Delivery

F.2.1 The contractor shall deliver one (1) Full-Scale Ballistic Test Quarter Section to the Government by February 29, 2004.

F.2.2 The contractor shall deliver one (1) Full-Scale Structural Quarter Test Section to the Government by February 29, 2004.

F.3 PERIOD(S) OF PERFORMANCE

F.3.1 The period of performance, including the delivery of the Final Technical and Scientific Report (TR#2), shall be from the date of contract award to February 29, 2004.

*** END OF NARRATIVE F 001 ***